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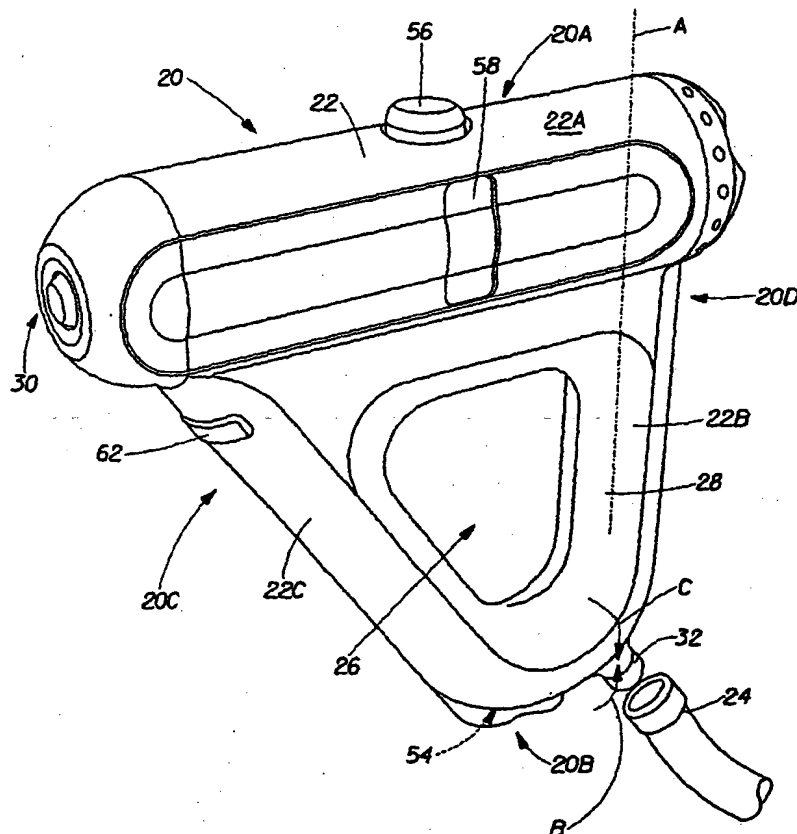
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[Continued on next page]

(54) Title: SPRAYER AND FILTER THEREFOR



(57) Abstract: A sprayer, which in one embodiment, is a hand held ergonomic sprayer is disclosed herein. The sprayer may include: a housing through which water flows; a handle for gripping by a user, which is joined to the housing; at least one spray nozzle operatively connected to the housing; and, a connection for a hose, the connection being joined to the housing. In one non-limiting embodiment, when the sprayer has one end of a water-filled hose connected thereto, the combination of the sprayer and suspended portion of the hose has a combined center of gravity that passes through the axis of the sprayer handle. The sprayers described herein may also have other features, and provide other benefits that do not require the sprayers to have an ergonomic design.

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## SPRAYER AND FILTER THEREFOR

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### CROSS REFERENCE TO RELATED PATENT APPLICATIONS

This application is a continuation-in-part of U.S. Patent application Serial No. 09/875,686, filed on June 6, 2001, which claims the benefit of the filing date of PCT international patent application US00/16343 filed on June 14, 2000.

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### FIELD OF THE INVENTION

The present invention relates to sprayers, and in one embodiment, to hand held sprayers that are ergonomically designed. The sprayers described herein may also have other features, and provide other benefits that do not require the sprayers to have an ergonomic design.

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### BACKGROUND OF THE INVENTION

A wide variety of spraying devices are known in the art. U.S. Patent 4,969,603 issued to Norman discloses a sprayer in the form of an end of the hose spray gun having an interchangeable and disposable cleaning fluid cartridge. Typically, the water in the cartridges, or other container in such a sprayer will concentrate the weight of the sprayer in a portion of the sprayer that is positioned forward of the handle of the sprayer. This will place a strain on the hand and wrist of the person using the sprayer.

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Therefore, there is a need for a sprayer, particularly an end of the hose sprayer having a portion for containing water, or another solution to be sprayed, that reduces the strain on the user's hand and wrist.

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The sprayers described herein may also have other features, and provide other benefits that do not require the sprayers to have an ergonomic design.

### **SUMMARY OF THE INVENTION**

5       The present invention relates to sprayers, and in one embodiment, to hand held sprayers that are ergonomically designed. The sprayers described herein may also have other features, and provide other benefits that do not require the sprayers to have an ergonomic design.

In one non-limiting embodiment, this invention relates to a hand-held ergonomic sprayer comprising:

- 10       a housing through which water flows, said housing having a barrel portion;
- a handle for gripping by a user, said handle having an axis, said handle being joined to the housing;
- at least one spray nozzle operatively connected to the housing; and,
- a connection for a hose, said connection being joined to the housing,
- 15       wherein said axis of the handle forms an angle of between about 75° to less than about 180° with said barrel portion, and said housing, when combined with a water-filled hose having an end connected to said connection, has a combined center of gravity that passes through the axis of the handle.

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### **BRIEF DESCRIPTION OF THE DRAWINGS**

While the specification concludes with claims particularly pointing out and distinctly claiming the invention, it is believed that the present invention will be better understood from the following description taken in conjunction with the accompanying drawings in which:

Figure 1 is a perspective view of one non-limiting embodiment of an ergonomic sprayer.

Figure 2 is a front view of the sprayer.

Figure 3 is a side elevational view from the left side of the sprayer as shown in Figure 2.

Figure 4 is a top view of the sprayer.

Figure 5 is a side elevational view from the left side of the sprayer.

5 Figure 6 is a rear view of the sprayer.

Figure 7 is a bottom view of the sprayer.

Figure 8 is a perspective view of one non-limiting embodiment of a filter for a sprayer, such as the sprayer shown in Fig. 1.

Figure 9 is a schematic side view of the interior of the sprayer shown in Figs. 1-7.

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### **DETAILED DESCRIPTION OF THE INVENTION**

The present invention relates to sprayers, and in one embodiment, to hand held sprayers that are ergonomically designed. The sprayers described herein may also have other features, and provide other benefits that do not require the sprayers to have an ergonomic design.

15 Figures 1 - 7 show one non-limiting embodiment of an ergonomically-designed, hand-held sprayer according to the present invention. It should be understood that the present invention is not limited to the embodiment shown in the drawings, and that the ergonomic sprayer may be provided in many other configurations.

20 As shown in Figure 1, this embodiment of the ergonomic sprayer (or "sprayer") 20 has a generally triangular shape. More particularly, as shown in Figs. 3 and 5, this sprayer 20 a right triangular shape when viewed from the side. The sprayer 20 has an upper portion 20A, an opposed lower portion 20B that is generally oriented toward the ground when the sprayer is in operation, a front portion 20C that is oriented toward the surface to be sprayed when the sprayer is in operation, and an opposed rear portion 20D.

The sprayer 20 comprises a housing or structure 22. In the embodiment shown, the housing 22 has a structure that forms a closed loop. This may provide the sprayer 20 with improved durability in comparison to sprayers that have components that extend outwardly in the form of free ends that are not joined to form a closed loop. Durability is of interest since the sprayer 20 may be dropped onto concrete, or other hard surfaces, such as when using the sprayer 20 to wash a car, for example.

In the embodiment shown, the housing 22 has three portions: first portion (or "barrel portion") 22A, second portion (or "handle portion") 22B, and third portion ("filter-containing portion") 22C. Each of these three portions has first and second ends that are joined as shown in the drawing figures to form the closed triangular shape. The ends of these portions of the housing can be referred to by any other suitable name, such as front end, rear end, upper end, and lower end, that describes their position or orientation. It will be appreciated that, if desired, the housing 22 can be formed into any number of other suitable shapes (other than a right triangular shape) that form a closed loop. Suitable shapes include, but are not limited to other types of triangles, or squares, rectangles, and the like. The portions of the housing 22 that form the closed loop are not limited to rectilinear portions. These portions may be rectilinear, curvilinear, or both. It should also be appreciated that, in alternative embodiments, the sprayer housing may be in a configuration that does not form a closed loop.

The housing 22 has a generally centrally located opening 26 and a handle 28 for gripping by a user. The handle has an axis, A. The sprayer further comprises at least one spray nozzle 30 that is operatively connected to the housing 22, and a hose connection (or simply "connection") 32 for a hose 24. Preferably water flows through at least some portions of the housing 22 when the sprayer 20 is connected to a hose 24 and is in use.

Figure 9 is a schematic side view of the interior of the sprayer shown in Figs. 1-7. Figure 9 shows that in this embodiment, the sprayer 20 may also comprise one or more conduits (or flow channels or flow paths) through which water may flow. The sprayer housing 22 can comprise any suitable number of flow paths. Preferably, in the embodiment shown, the sprayer housing 22 comprises three flow paths 34, 36, and 38. The sprayer 20 may also comprise a flow regulator 40, an on/off switch 42, a flow selector 44, a compartment 46 for a composition to be dispensed, a filter compartment 48, and a filter 50.

The handle 28 can comprise a part of the housing 22, or it can comprise a separate element that is attached to the housing 22. The term "joined to", as used herein, includes embodiments in which an element such as the handle comprises a part of (or is integral with) another element, such as the housing 22, or in which the element comprises a separate element that is attached to another element, such as a separate handle that is attached to the housing 22. In the embodiment shown, the handle 28 comprises a portion of the housing 22. The handle 28 also comprises a portion of the housing 22 through which water flows. The axis, A, of the handle 28 preferably forms an angle  $\alpha$  (shown in Fig. 3) of between about  $75^\circ$  to less than about  $180^\circ$ , preferably between about  $85^\circ$  to less than about  $135^\circ$ , and more preferably, about  $90^\circ$  with the barrel portion 22A of the housing 22. It should be understood that the user can hold the sprayer shown in the drawings by other portions thereof, such as by the barrel portion 22A, or by both the handle 28 and the barrel portion 22A, or by both the handle 28 and the filter-containing portion 22C. Thus, the location of the handle is not limited to the portion of the sprayer designated by reference number 28.

There can be any suitable number of spray nozzles 30. Figures 1-7 show that the sprayer 20 may have a single nozzle 30. Figure 9 shows that in a preferred embodiment, the sprayer 20 has three nozzles. The spray nozzles 30 in the embodiment shown in Figure 9 comprise a first nozzle 30A, a second nozzle 30B, and a third nozzle 30C. In this embodiment, the first nozzle 30A is used for dispensing unfiltered water. The second nozzle 30B is used for dispensing a solution, which in this particular case, is a cleaning solution comprising soap. The third nozzle 30C is used for dispensing filtered water. The spray nozzles 30 can be covered by a cover or shield to protect them from damage when the sprayer 20 is set down by the user.

The hose connection 32 is oriented so that the hose 24 extends at an angle  $\beta$  away from the sprayer 20. The angle  $\beta$  shown in Fig. 9 is preferably oriented so that the hose 24 will extend out from the back 20D of the sprayer, rather than straight down toward the ground. The angle  $\beta$  between the extension of the axis A of the handle 28 and the centerline of the hose connection 32 is preferably greater than  $0^\circ$  and less than about  $90^\circ$ . The complementary angle C that the hose connection makes with the axis A of the handle 28 is, therefore, greater than about  $90^\circ$  and less than about  $180^\circ$ . This will orient the hose 24 so that the elevated portion of a water-filled hose can be used to at least partially balance the weight of the portions of the sprayer 20 that lie in front of the axis A of the handle 28. The angle that the hose connection 32 makes will also better

to allow the sprayer 20 to be conveniently set down on the ground on its front portion 20C when the sprayer 20 is not in use. When the sprayer 20 is set down in this manner, the hose 24 will run parallel to the front portion 20C and to the ground.

The filter 50 can comprise any suitable type of filter. In one non-limiting embodiment, the filter 50 comprises an ion exchange resin filter. The filter 50 can be permanent or replaceable. The filter 50 can be in any suitable configuration. Preferably, in the embodiment shown, the filter 50 is a replaceable filter that resides inside the third portion 22C of the housing 22. This filter 50 shown is a generally cylindrical "double barrel" filter, and more specifically is a housing comprised of two cylindrical portions 50A and 50B that are joined together along their axes to form a compound cylindrical filter with a cross-section that resembles the figure "8". The double barrel filter provides double the length of the filter material for the water to flow through than a cylindrical filter of the same length. The filter 50 is in a more compact configuration than an equivalent cylindrical filter provided with an equivalent length of filter material in a linear (end-to-end) arrangement. Numerous other embodiments of the filter 50 can be used to provide a similar benefit, if desired. For instance, in one non-limiting embodiment, the filter 50 can be in the form of concentric cylinders in which the water to be purified alternatively flows inside one cylinder and then outside such a cylinder but within an outer concentric cylinder. In each of these, or other embodiments, more than two cylindrical structures can be used. In other embodiments, the portions of the filters that are described as being cylindrical can have other suitable cross-sections.

The reduced overall length of the filter 50 allows the filter to be placed into the ergonomically-shaped sprayer 20 shown in the drawings. The fact that the third portion 22C of the housing angles 22 back toward the handle 28 (rather than extending straight down) also improves the ergonomics and balance of the sprayer 20 by reducing the moment arm of the filter-containing portion 22C relative to the handle. The filter 50 can be inserted into and removed from the sprayer housing 22 through an opening 54 in the lower portion 20B of the sprayer 20.

The sprayer 20 may have additional features or elements. These additional features or elements may include, but are not limited to: a cap 56 for opening and closing the compartment 46 for the substance to be dispensed; a window 58 for viewing the level of the substance in the compartment 46; a selector dial 60 (Fig. 3); and, a mechanism, such as a button 62 for releasing the filter 50 from the filter compartment 48.



The components of the sprayer 20 can be made of any suitable material. In one non-limiting embodiment, the components of the sprayer 20 are made of injection molded plastic. In such an embodiment, the housing 22 can be injection molded in two pieces or halves that are fastened together after the other components of the sprayer 20 are placed inside. The sprayer 20  
5 can be made and assembled by methods that are well known in the art.

The sprayer 20 is operated in the following manner. The user connects the hose 24 to the hose connection 32. The user then turns on the water supply to the hose. The user also selects the desired output of the sprayer (such as unpurified water, soapy water, or purified rinse water) using the selector dial 60. The user can turn the sprayer on either before, or after turning on the  
10 water supply. The user can also make the desired selection before or after turning on the water supply. As shown in Fig. 9, if the user selects the normal rinse setting, the water will flow from the hose 34 past the compartment 46 containing a substance to be dispensed, and out the first nozzle 30A. If the user selects the wash setting, the water will flow into the compartment 46, and will mix with the substance to be dispensed, which may, for example, be a soap composition, and  
15 out the second nozzle 30B. If the user selects the purified rinse setting, the water will flow through the filter 50 and out the third nozzle 30C. In the particular embodiment shown where a double barrel filter is used, as shown in Fig. 9, the water will flow into one portion of the filter 50 such as portion 50A shown in Fig. 8, and out the end of that portion. The flow conduit in the filter compartment 48 is configured so that the water will then double back and flow through  
20 another portion of the filter 50, such as portion 50B, and out nozzle 30C.

The sprayer 20 is preferably designed so that when combined with a water-filled hose having one end connected to the hose connection has a combined center of gravity (of the sprayer 20 and the portion of the hose that is held above the ground) that passes through the axis of the handle 28 to reduce the strain on the user's hand and wrist. The sprayer 20 may, thus, use the  
25 weight of the water-filled hose to balance the weight of the sprayer.

Numerous other embodiments of the sprayer and its components are possible. The following are all non-limiting embodiments. In one embodiment, the hose could extend rearwardly out of the back of the top portion of the sprayer (or elsewhere between the top portion of the sprayer and the bottom portion of the sprayer). In other embodiments, the sprayer need not  
30 have a filter, and the filter-containing portion 22C may contain some other element instead of a filter. In other embodiments, the positions of the elements or components of the sprayer could be

interchanged, or rearranged. In these, or other embodiments, the sprayer may have additional compartments for substances to be dispensed, such as a finish coating for a surface such as the exterior of an automobile. In such a case, there may be additional flow paths through such other compartments. In other embodiments, the flow paths can be arranged so that water flows in more than one direction (e.g., clockwise and counter clockwise) around the closed loop structure formed by the housing. The sprayer 20 may also be provided with features that allow the substances to be dispensed to be metered. This will allow the user to control the amount of such substances that are mixed with the water flowing through the sprayer. If desired, the substances that are dispensed can be mixed with purified water, instead of with tap water. The sprayers described herein may also have other features, and provide other benefits that do not require the sprayers to have an ergonomic design.

The disclosure of all patents, patent applications (and any patents which issue thereon, as well as any corresponding published foreign patent applications), and publications mentioned throughout this description are hereby incorporated by reference herein. It is expressly not admitted, however, that any of the documents incorporated by reference herein teach or disclose the present invention.

While particular embodiments of the subject invention have been described, it will be obvious to those skilled in the art that various changes and modifications of the subject invention can be made without departing from the spirit and scope of the invention. It will be clear to those skilled in the art that various changes and modifications may be made without departing from the scope of the invention and the invention is not to be considered limited to the embodiments that are described in the specification.

## WHAT IS CLAIMED IS:

1. A hand-held ergonomic sprayer comprising:

a housing having at least a portion through which water flows, said housing having a barrel portion;

- 5 a handle for gripping by a user, said handle having an axis, said handle being joined to said housing;

at least one spray nozzle operatively connected to said housing; and,

a connection for a hose, said connection being joined to said housing,

- 10 wherein said axis of the handle forms an angle of between about 75° to less than about 180° with said barrel portion, and said housing when combined with an elevated portion of a water-filled hose having an end connected to said connection, has a combined center of gravity with said elevated portion of the hose that passes through the axis of said handle.

- 15 2. The sprayer of Claim 1 wherein said handle comprises a portion of said housing through which water flows.

3. The sprayer of Claim 1 wherein said connection for a hose extends rearwardly from said sprayer housing at an angle.

4. The sprayer of Claim 1 comprising multiple flow nozzles.

5. The sprayer of Claim 1 comprising a filter.

- 20 6. A hand-held sprayer comprising:

a housing, said housing having a barrel portion;

a handle for gripping by a user, said handle being joined to said housing;

at least one spray nozzle operatively connected to said housing;

wherein said housing comprises a structure that forms a closed loop.

7. The sprayer of Claim 6 wherein said housing has the configuration of a triangle when viewed from the side.

8. The sprayer of Claim 7 wherein:

5 the barrel portion of the housing has a front end and a rear end;

the handle comprises an integral portion of the housing, and said handle has a first end and a second end; and

the housing further comprises a third portion having a first end and a second end;

10 wherein the first end of the handle is joined to the barrel portion of the housing adjacent to the rear end of the barrel portion; the second end of the handle is joined to the second end of the third portion of the housing; and the first end of the third portion of the housing is joined to the barrel portion of the housing adjacent to the front end of the barrel portion.

9. A hand-held sprayer comprising:

15 a housing, said housing having a barrel portion and a filter-containing portion, said filter-containing portion containing a filter and at least one flow path for water to flow through said filter, wherein said at least one flow path is configured so that water flows through a first portion of the filter, and then changes direction and flows through a second portion of the filter;

20 a handle for gripping by a user, said handle being joined to said housing; and

at least one spray nozzle operatively connected to said housing.

10. The hand-held sprayer of Claim 9 wherein the filter-containing portion of the housing has one end that is joined to the barrel portion of the housing, and said filter-containing portion of the housing is oriented so that it forms an angle with the barrel portion of the housing that extends toward the handle of the sprayer.

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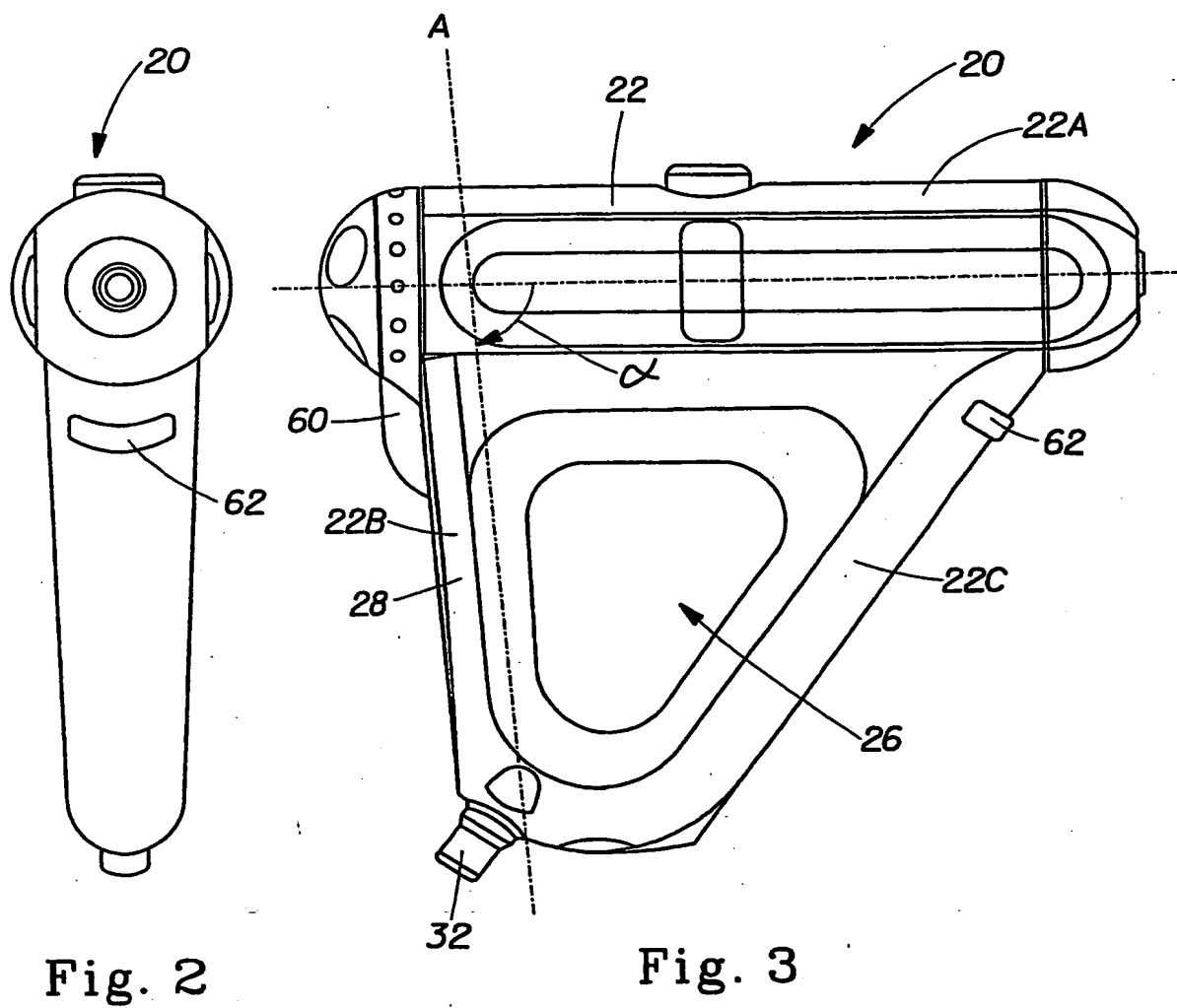
11. A filter for purifying water comprising two cylindrical portions, said two cylindrical portions of said filter each having an axis, said two cylindrical portions being joined together along their axes to form a compound filter having a cross-section in the configuration of a figure 8.

5 12. A filter for purifying water, said filter comprising two cylindrical elements, said two cylindrical elements comprising a first cylindrical element and a second cylindrical element, wherein said first cylindrical element is positioned inside said second cylindrical element to form a compound filter having a cross-section with the configuration of concentric circles.

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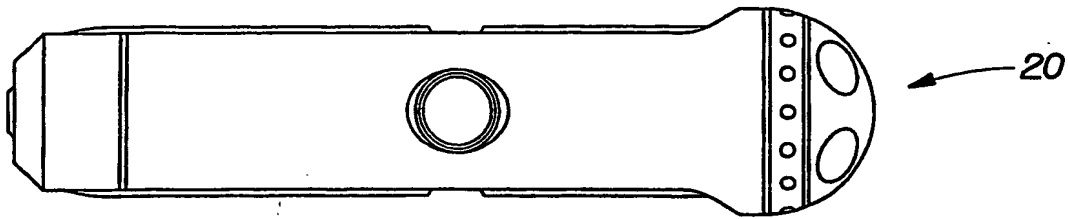


Fig. 4

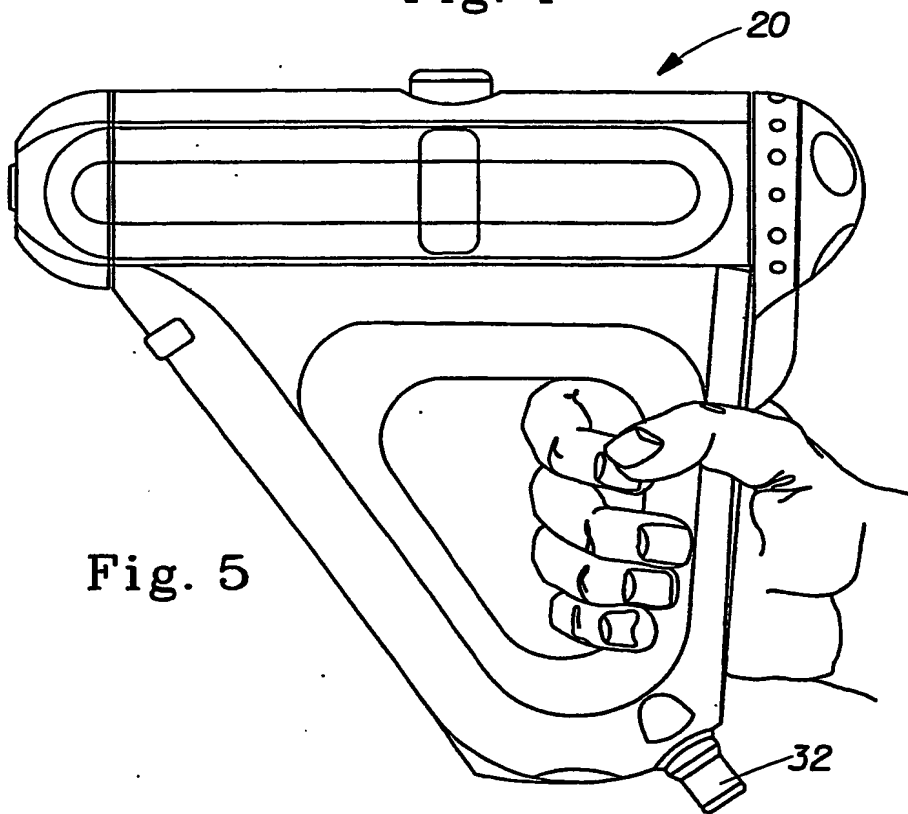


Fig. 5

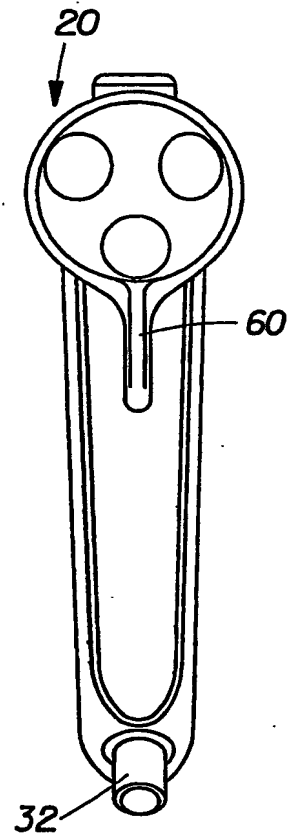


Fig. 6

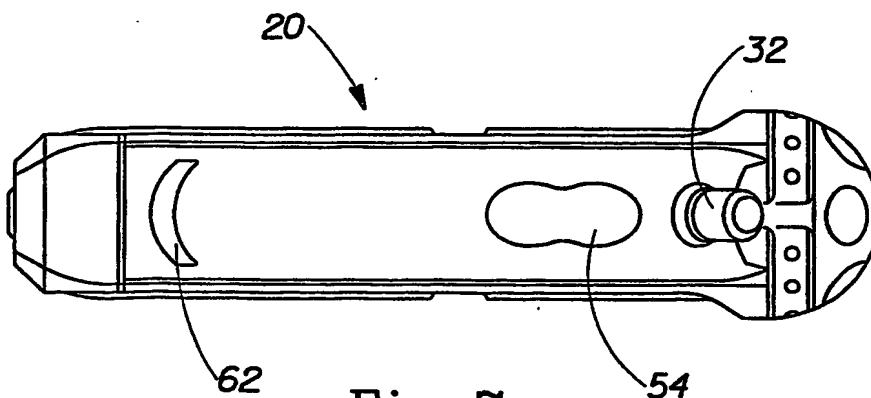
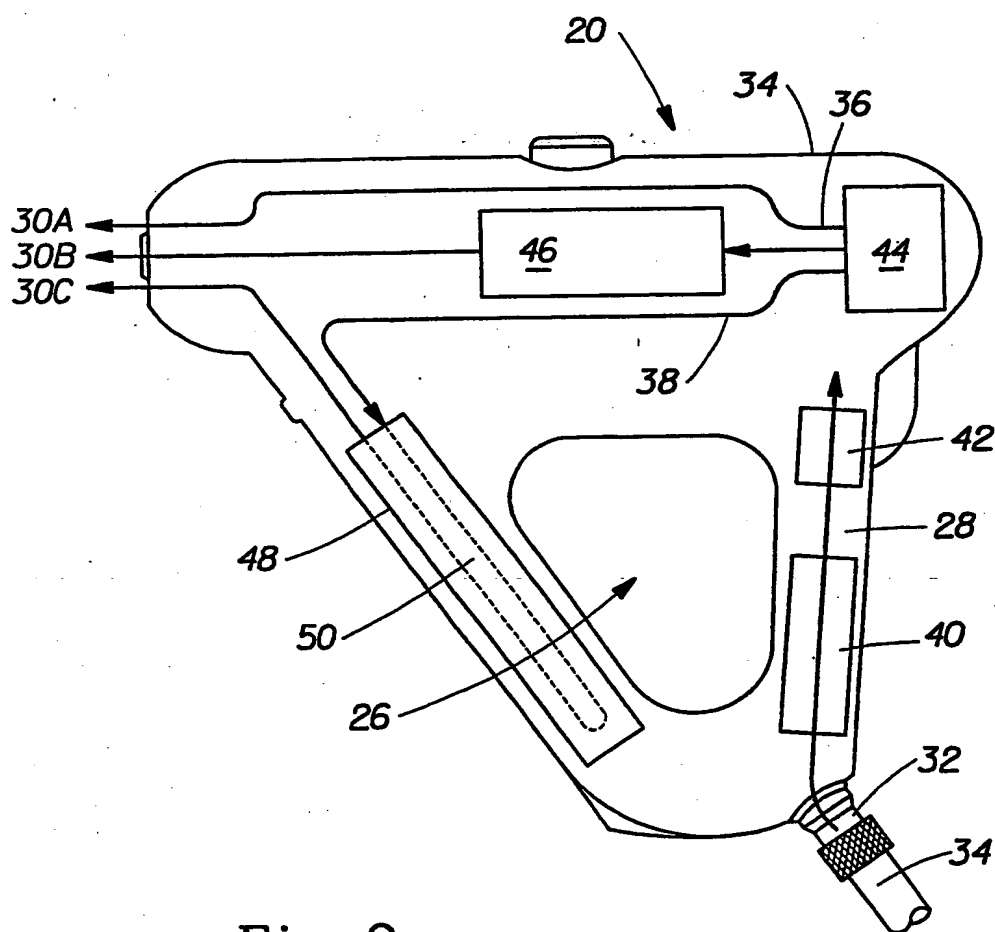
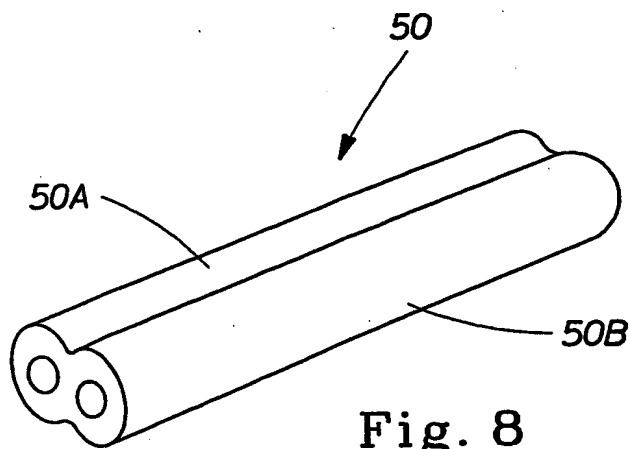


Fig. 7

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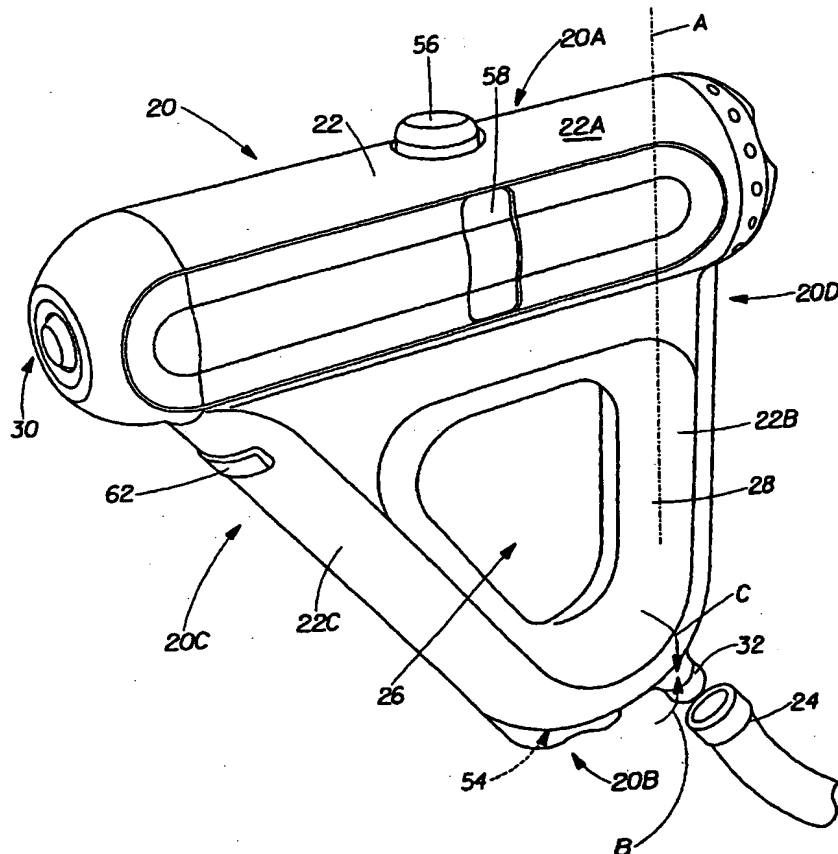
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[Continued on next page]

(54) Title: **SPRAYER AND FILTER THEREFOR**



(57) Abstract: A sprayer, which in one embodiment, is a hand held ergonomic sprayer is disclosed herein. The sprayer may include: a housing through which water flows; a handle for gripping by a user, which is joined to the housing; at least one spray nozzle operatively connected to the housing; and, a connection for a hose, the connection being joined to the housing. In one non-limiting embodiment, when the sprayer has one end of a water-filled hose connected thereto, the combination of the sprayer and suspended portion of the hose has a combined center of gravity that passes through the axis of the sprayer handle. The sprayers described herein may also have other features, and provide other benefits that do not require the sprayers to have an ergonomic design.

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# INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER  
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According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)  
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## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 1 872 058 A (SVEND BRAMSEN ET AL) 16 August 1932 (1932-08-16) page 1, line 19 - line 25	1,2
A	PATENT ABSTRACTS OF JAPAN vol. 1997, no. 02, 28 February 1997 (1997-02-28) & JP 08 266956 A (IWATA AIR COMPRESSOR MFG CO LTD), 15 October 1996 (1996-10-15) abstract	1-3
A	EP 0 808 662 A (ILLINOIS TOOL WORKS) 26 November 1997 (1997-11-26) column 5, line 39 - line 48	1-3
	-/--	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

### \* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "&" document member of the same patent family

Date of the actual completion of the international search

26 September 2002

Date of mailing of the international search report

30. 01. 2003

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# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US 02/17415

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 3 339 841 A (BEACH JR HOWARD W) 5 September 1967 (1967-09-05) column 3, line 53 - line 57 column 9, line 40 - line 45 ---	1-3
A	WO 97 48927 A (ARMOR ALL PROD CORP ;JACKSON THOMAS T JR (US); HAWES CHARLES (US);) 24 December 1997 (1997-12-24) page 12, line 7 - line 17 -----	4,5

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US 02/17415

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
  
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
  
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
  
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
  
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-5

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-5

Sprayer comprising a housing, said housing when combined with an elevated portion of water-filled hose, has a combined center of gravity on the axis of the handle

2. Claims: 6-8

Sprayer with a housing that forms a closed loop

3. Claims: 9-12

Filter in which the direction of the water flow is changed.  
Spayer comprising this filter.



# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 02/17415

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 1872058	A	16-08-1932	NONE	
JP 08266956	A	15-10-1996	NONE	
EP 0808662	A	26-11-1997	US 5803313 A AU 683820 B1 BR 9702393 A CA 2201676 A1 CN 1169950 A ,B EP 0808662 A2 JP 10043668 A KR 214107 B1	08-09-1998 20-11-1997 15-09-1998 21-11-1997 14-01-1998 26-11-1997 17-02-1998 02-08-1999
US 3339841	A	05-09-1967	NONE	
WO 9748927	A	24-12-1997	AU 3804197 A WO 9748927 A1	07-01-1998 24-12-1997

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